



## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
US Department of Commerce  
United States Patent and Trademark  
Office, PCT  
2011 South Clark Place Room  
CP2/5C24  
Arlington, VA 22202  
ETATS-UNIS D'AMERIQUE  
in its capacity as elected Office

Date of mailing (day/month/year) 29 May 2001 (29.05.01)	
International application No. PCT/GB00/03616	Applicant's or agent's file reference RJP/GRK/S763
International filing date (day/month/year) 21 September 2000 (21.09.00)	Priority date (day/month/year) 23 September 1999 (23.09.99)
Applicant HALLIWELL, Larry et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

18 April 2001 (18.04.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Pascal Piriou Telephone No.: (41-22) 338.83.38
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# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>RJP/GRK/S763</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/03616</b>	International filing date (day/month/year) <b>21/09/2000</b>	(Earliest) Priority Date (day/month/year) <b>23/09/1999</b>
Applicant <b>ALLIED BIO CORPORATION LIMITED et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

### 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03616

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61L2/23 A61L9/012 A61L11/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61L A23B A01N A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, FSTA, INSPEC, COMPENDEX, CHEM ABS Data, EMBASE, MEDLINE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 431 844 A (RENTOKIL LTD) 12 June 1991 (1991-06-12) page 2, line 34 - line 41 page 3, line 26 - line 39 page 3, line 54 -page 4, line 17 examples 2-6	1-11
X	WO 94 10233 A (COMMW SCIENT IND RES ORG ;STEELE ROBERT JOHN (AU); JIANG XIANG ZHO) 11 May 1994 (1994-05-11) page 1, line 5 - line 19 page 2, line 4 - line 13 page 2, line 33 -page 3, line 32 page 4, line 8 - line 15  -/--	1-11

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

6 December 2000

Date of mailing of the international search report

14/12/2000

Name and mailing address of the ISA

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Authorized officer

Menidjel, R

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03616

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>FR 2 536 045 A (GROSS PETER)  18 May 1984 (1984-05-18)  page 1, line 6 - line 25  page 2, line 12 - line 16  claims 1-7</p> <p style="text-align: center;">-----</p>	1-11

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/03616



Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0431844 A	12-06-1991	AU 642181 B AU 6769390 A CA 2031347 A GB 2238721 A,B NO 905221 A NZ 236301 A PT 96082 A ZA 9009684 A	14-10-1993 06-06-1991 05-06-1991 12-06-1991 05-06-1991 26-05-1993 15-10-1991 30-10-1991
WO 9410233 A	11-05-1994	AU 693424 B AU 5366594 A CA 2147872 A EP 0666883 A JP 8502772 T NZ 257311 A	02-07-1998 24-05-1994 11-05-1994 16-08-1995 26-03-1996 27-02-1996
FR 2536045 A	18-05-1984	ES 517389 D ES 8400961 A GR 77825 A IT 1205287 B	16-12-1983 16-02-1984 25-09-1984 15-03-1989

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference RJP/BA/SLH/S763	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/03616	International filing date (day/month/year) 21/09/2000	Priority date (day/month/year) 23/09/1999
International Patent Classification (IPC) or national classification and IPC A61L2/23		
Applicant ALLIED BIO CORPORATION LIMITED et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"><li>I <input checked="" type="checkbox"/> Basis of the report</li><li>II <input type="checkbox"/> Priority</li><li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li><li>IV <input checked="" type="checkbox"/> Lack of unity of invention</li><li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li><li>VI <input type="checkbox"/> Certain documents cited</li><li>VII <input checked="" type="checkbox"/> Certain defects in the international application</li><li>VIII <input checked="" type="checkbox"/> Certain observations on the international application</li></ul>		
Date of submission of the demand  18/04/2001	Date of completion of this report  12.12.2001	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Connor, M  Telephone No. +49 89 2399 8402 	

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03616

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-11 as originally filed

**Claims, No.:**

1-11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form..
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03616

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☒ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:  
**see separate sheet**

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims
	No:	Claims 1-11
Inventive step (IS)	Yes:	Claims
	No:	Claims 1-11
Industrial applicability (IA)	Yes:	Claims 1-11
	No:	Claims



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB00/03616

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2. Citations and explanations  
**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**R Item IV**

**Lack of unity of invention**

1 The following inventions are called for in the present application:

- (a) claim 1; and
- (b) claim 4.

They are linked by the following features: sterilizing block comprising a sulphur dioxide activating compound wherein moisture absorbed by the block reacts with the sulphur dioxide activating compound to form sulphur dioxide. As shown in point V-2&3 below, said features do not constitute an inventive concept linking the two inventions.

The applicant is asked to state upon which invention further prosecution of this application should be based and to limit the application accordingly. Other inventions are to be excised from the claims and description.

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement, and**

**Re Item VIII**

**Certain observations on the international application**

1 The following documents are referred to in the present opinion:

- D1: EP-A-0 431 844 (RENTOKIL LTD) 12 June 1991 (1991-06-12)
- D2: WO 94 10233 A (COMMW SCIENT IND RES ORG ;STEELE ROBERT JOHN (AU); JIANG XIANG ZHO) 11 May 1994 (1994-05-11)
- D3: The Chambers Dictionary, Chambers, entries: "film," "solid," and "tablet" (2000)

2 Claims 1, 4, and 11 do not meet the requirements of clarity set forth in Article 6 PCT. The term "block" does not properly define the scope of protection sought by the applicant in said claims. The description does not give any further information concerning the definition of said "block" other than it differs from a powder or granular form (cf. p. 1, l. 26) and that a "tablet" is an embodiment of a "block" (cf. Example 1). The definition of the term "block" is quite relevant since it seems to be the only feature of the subject matter of the foregoing claims not specifically mentioned in the

prior art documents D1 and D2 (cf. point V-3, below). In particular, the difference between a "tablet" defined in D3 as "a small, flattish slab" or "stiff sheet" and a film as disclosed in D2 (cf. point V-3.2 below) defined in D3 as "thin sheet, layer or coating" may become very unclear in some cases: when does a thick or stiff film become a thin tablet, and inversely is a question hard to answer in certain cases.

3 The sterilizing product proposed in claims 1 and 4 of the present application cannot be considered as being novel nor as involving an inventive step (Article 33(2)&(3) PCT) for the following reasons.

3.1 D1 discloses a sterilizing product comprising the same components as called for in claims 1 and 4 of the present application. Before use (i.e., before exposure to moisture), said product is in the form of a stable viscous solution (cf. last line of the abstract of D1). In spite of the lack of clarity associated with the term "block" as noted in point V-2 supra, a viscous solution clearly differs from a "block" in that the former is a liquid, and the latter a solid. On p. 5 of D1, however, it is mentioned that "once the container is opened, [...] the preparation is no longer free flowing," (cf. D1, p. 5, ll. 18-19) i.e., "resisting to change of shape" which is the definition given in D3 of the term "solid". The non-free-flowing preparation is thus defined as solid or glassy<sup>1</sup> (i.e., T<sub>g</sub> is below room or use temperature). The product of D1 being active during several weeks (cf. D1, p. 5, l. 47), it is clear that at the time the preparation is no longer free flowing, it still comprises all the components called for in claims 1 and 4 of the present application. Said embodiment is qualified in D1 as "advantageous" "from the point of view of handling" (cf. D1, p. 5, l. 21).

Consequently, the subject matter of claims 1 and 4 is not new in view of the disclosure of D1.

3.2 D2 discloses a polymeric film and single or multi-layer materials comprising all the components called for in claims 1 and 4 of the present application. The term "block," including "tablet" as embodiment, used therein is not sufficiently defined in the

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<sup>1</sup> The same applies to e.g., window glass which is a highly viscous material (i.e., substantially not free-flowing) —and not a crystalline solid— which flows slowly but surely due to gravity as can be seen on old windows or stained glasses, the bottom of which being thicker than the top; in spite of its flowing nature, a window glass is generally defined as a solid, because flow is so slow that it is hardly detectable.

present application to distinguish it from the term "film" used in D2, as explained in point VIII-2 supra. Consequently, it is not possible for the skilled person to differentiate the subject matter of claims 1 and 4 from the films disclosed in D2.

Consequently, the subject matter of claims 1 and 4 is not new in view of the disclosure of D2.

- 3.3 The subject matter of claims 1 and 4 does not involve an inventive step, because the problem to be solved in the present application is to prevent generation of harmful dust upon use thereof, which is solved by the products of both D1 and D2.
- 4 The method of sterilizing proposed in claim 11 of the present application cannot be considered as being novel nor as involving an inventive step (Article 33(2)&(3) PCT) for the following reasons. D1 and D2 both disclose a method comprising the use of the product disclosed therein, respectively. It is not inventive for the same reason as set forth in point V-3.3 supra.
- 5 Dependent claims 2, 3, 5-10 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, in view of the disclosure of both D1 and D2.
- 6 Independent claims should be drafted in the two part form as instructed in Rule 6.3(b) PCT.

**Re Item VII**

**Certain defects in the international application**

- 1 Prior art documents should be cited and their content briefly commented (Rule 5(a)(ii) PCT).
- 2 The last three paragraph of p. 11 are redundant and should be deleted.

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
29 March 2001 (29.03.2001)

PCT

(10) International Publication Number  
WO 01/21224 A1

- (51) International Patent Classification<sup>7</sup>: A61L 2/23, (74) Agents: PIDGEON, Robert, John et al.; Appleyard Lees, 15 Clare Road, Halifax HX1 2HY (GB).  
9/012, 11/00
- (21) International Application Number: PCT/GB00/03616
- (22) International Filing Date:  
21 September 2000 (21.09.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
9922415.6 23 September 1999 (23.09.1999) GB
- (71) Applicant (for all designated States except US): ALLIED BIO CORPORATION LIMITED [GB/GB]; Providence Works Nield Street, Oldham, Lancashire OL8 1QG (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): HALLIWELL, Larry [GB/GB]; 10 Hillmount, Hollins Estate, Dukinfield, Cheshire SK16 5HT (GB). LATHAM, George [GB/GB]; 1 Brooklet Close, Springhead, Oldham OL4 5UB (GB). PEEL, Adrian [GB/GB]; 210 Turf Lane, Royton OL2 6EU (GB).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/21224 A1

(54) Title: STERILISING AGENTS AND METHODS

(57) Abstract: A sterilising agent is provided for use in a generally enclosed airspace within a container, the sterilising block comprising a sterilising agent in the form of a sulphur dioxide activating compound which reacts with moisture in the airspace to release sulphur dioxide, wherein the sterilising agent further comprises a moderating compound, which inhibits or accelerates the release of sulphur dioxide from the block. The use of a block provides a sterilising composition which does not produce harmful dust during insertion into an airspace.

STERILISING AGENTS AND METHODS

This invention relates to sterilising agents, in particular to those which, when activated, form sulphur dioxide, and also to a method of sterilising substantially enclosed airspaces.

It is well known to use sterilising agents which form sulphur dioxide to sterilise enclosed spaces. Such agents have been used in a wide variety of applications including sterilisation of fermentation bins and sanitary bins.

In the case of fermentation bins, granules or tablets of the sterilising agent are dissolved rapidly in water in the fermentation bin, which quickly releases large quantities of sulphur dioxide for fast sterilisation.

In the case of sanitary bins, where there is only a small amount of moisture in the air and/or materials inside the bin, it is usual to add a portion of the sterilising agent in powder or granule form. The powder or granules have a large surface area which enables activation by the available moisture to form a sufficient amount of sulphur dioxide for sterilisation.

The powder or granules are usually added by sprinkling them on the bottom of the container, either from a porous container or by opening individual sachets of sterilising agent and pouring the powder or granules into the container.

However, when the sterilising agent is applied in this manner a certain amount of dust from the powder or

granules is generated, which can be harmful to a user if inhaled. People with bronchial afflictions, such as asthma, may be especially vulnerable to adverse effects from the dust.

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Some sterilising agents for sanitary bins, enclosed spaces and the like are delivered as powder or granules in porous sachets, which allow moisture to penetrate the sachet and sulphur dioxide generated to diffuse out into  
10 the bins. However this method of delivery does not prevent all the dust generated by the powder or granules inside the sachet from escaping into the surrounding atmosphere, creating a hazard to the user. Such dust and/or powder release is hazardous to people, particularly,  
15 those with bronchial complaints, for example asthmatics. Furthermore, the porous sachets are prone to tearing.

It is therefore an object of preferred embodiments of the present invention to provide a sterilising agent which  
20 forms sulphur dioxide upon activation with available moisture, in a form which does not produce harmful dust during insertion into an enclosed space.

It is a further object of preferred embodiments of the present invention to provide a sterilising agent which  
25 releases sulphur dioxide over a prescribed period of time for efficient sterilisation, for a particular application.

Therefore, according to a first aspect of the present  
30 invention there is provided a sterilising block comprising a sterilising composition for use in an airspace within a container, the sterilising composition comprising a sulphur dioxide activating compound, wherein moisture

absorbed by the block reacts with the sulphur dioxide activating compound to form sulphur dioxide, and wherein the sterilising composition further comprises a water soluble organic acid and a corresponding water soluble salt of the organic acid.

Suitably the water soluble organic acid and water soluble salt of the organic acid are water soluble at ambient temperature.

10

The water soluble organic acid and corresponding salt act to inhibit the release of sulphur dioxide from the sterilising composition. While the applicant is not limited by any theoretical explanation, it is believed the water soluble acid and salt act as a buffer to inhibit formation of sulphur dioxide, thus prolonging the term of action of the composition. Thus the term "water-soluble" relates to the organic acid and corresponding salt being sufficiently soluble in water at ambient temperature to act as a buffer, in the composition of the present invention, as moisture is absorbed by the block.

Preferably the water soluble organic acid and corresponding salt maintain the sterilising block, as moisture is absorbed, at a pH of not more than 7.5, more preferably at a pH not more than 6.5. Preferably the water soluble organic acid and corresponding salt maintain the sterilising block, as moisture is absorbed, at a pH of not less than 3.5, more preferably not less than 4.5 and most preferably not less than 5.5. A preferred pH range is 5.5 - 6.5.



Suitably the organic acid is a water soluble organic acid comprising 1 to 3 carboxylic acid groups, or anhydrides thereof. Alternatively the organic acid may be ascorbic acid.

5

Preferred water soluble organic acids include lactic acid, malic acid, fumaric acid, pyruvic acid, succinic acid, ascorbic acid and citric acid, of which citric acid and malic acid are most preferred.

10

Suitably the organic acid and corresponding salt each comprise 1-12 carbon atoms, preferably 1-9 carbon atoms, more preferably 1-6 carbon atoms.

15

The corresponding salts of the water soluble acid include magnesium, sodium and potassium salts. Preferred corresponding salts of malic acid or citric acid are sodium malate and sodium citrate respectively.

20

Suitably the water soluble organic acid comprises at least 1%wt of the total weight of the sterilising composition, more preferably at least 2% wt, as added to the sterilising composition. Preferably the water soluble organic acid comprises no more than 10% wt of the total weight of the sterilising composition, more preferably no more than 5% wt.

25

Suitably the corresponding salt of the organic acid comprises at least 1%wt of the total weight of the sterilising composition, more preferably at least 2%wt.

30

Preferably the corresponding salt of the organic acid comprises no more than 10% wt of the total weight of the

sterilising composition, more preferably no more than 5% wt...

Thus the preferred range of the water soluble organic  
5 acid and the corresponding salt, combined, is 4-10%wt of the total weight of the sterilising composition.

Most preferably the water soluble organic acid and the  
corresponding salt of the organic acid comprise equal  
10 amounts in the total weight of the sterilising composition.

All amounts described herein are a %wt of the total  
weight of the sterilising composition as added in the form  
15 of raw ingredients. It is understood that once the sterilising block absorbs moisture, the relative portions of the individual components of the composition may change, for example the organic acid and/or salt may dissociate in solution, and the proportion of sulphur  
20 dioxide activating compound will decrease on evolution of sulphur dioxide.

According to a second aspect of the present invention there is provided a sterilising block comprising a  
25 sterilising composition for use in an airspace within a container, the sterilising composition comprising a sulphur dioxide activating compound, wherein moisture absorbed by the block reacts with the sulphur dioxide activating compound to form sulphur dioxide and wherein  
30 the sterilising composition further comprises a hygroscopic compound.

It is believed that the hygroscopic compound increases the rate of release of sulphur dioxide from the sterilising agent by increasing the rate of uptake of moisture into the sterilising block. The hygroscopic compound enables the sterilising composition to be manufactured in a block with limited surface area for use in an airspace which is low in moisture, as it will enable the block to absorb a sufficient amount of moisture from the air and/or waste materials within the airspace to activate the sulphur dioxide activating compound.

Preferably the hygroscopic compound is a hygroscopic alkylbenzenesulphonate, or dialkylbenzenesulphonate. However, other types of hygroscopic material may be used.

A preferred dialkylbenzenesulphonate is diisopropylbenzenesulphonate.

Preferably the hygroscopic compound comprises at least 0.5%wt of the total weight of the sterilising agent, more preferably at least 1%wt.

Preferably the hygroscopic compound comprises no more than 5%wt of the total weight of the sterilising agent, more preferably no more than 2.5% wt.

Thus a preferred range for the hygroscopic compound is 1-2.5%wt of the total weight of the sterilising composition.

The block should be such that it produces an insubstantial amount, and preferably no, harmful dust when inserted into the airspace.

Suitably the block is a tablet or solid gel block. Preferably it is a tablet of consolidated powder or granules.

5

The sulphur dioxide may, preferably, be in gaseous form and/or may dissolve in water or an aqueous medium present in the air space, and so act, in the form of sulphurous acid or a salt thereof, as a liquid sterilising composition. It will be understood that further volatile compounds of sulphur may be formed, in addition to sulphur dioxide.

Preferably the sterilising composition comprises a polyglycol compound, more preferably a polyethylene glycol compound.

Suitably the polyglycol compound comprises at least 0.5%wt of the total weight of the sterilising composition, preferably at least 1%wt, as added to the sterilising composition.

Preferably the polyglycol compound comprises no more than 10%wt of the total weight of the sterilising composition, more preferably no more than 5% wt, as added to the sterilising composition.

Suitably the sulphur dioxide activating compound is a metabisulphite, preferably sodium metabisulphite or potassium metabisulphite.

Preferably the sulphur dioxide activating compound comprises at least 50% wt of the total weight of the sterilising composition, more preferably at least 60% wt.

5        Suitably the sulphur dioxide activating compound comprises no more than 95% wt of the total weight of the sterilising composition, preferably no more than 90% wt, more preferably no more than 80% wt.

10       The sterilising composition may additionally comprise one or more ancilliary ingredients, including a fragrance, a colouring compound, talc, sodium chloride, and a filler.

15       Suitably each block is supplied in its own sealed space. For example it may be individually wrapped or provided in "blister pack" form.

20       Alternatively blocks may be packaged together, preferably in a sealed container containing, separately, a hygroscopic agent (for example silica gel) able preferentially to absorb atmospheric moisture, and so prevent premature activation of the sulphur dioxide activating compound. Such a hygroscopic agent may also be employed when each block is supplied in its own sealed space. Thus, the sterilising blocks may be kept in an inactive form until needed, prolonging their shelf-life and subsequent utility.

30       Preferably the container is generally enclosed. Preferably the container is used for deposit or storage of contaminated, or more preferably biological materials, for example biological soils, microorganisms, or biological waste products.

Preferably the container is a sanitary bin.

Alternatively, the container may be a medical dressing  
5 container, a nappy bin, a used sharps bin, a post box, a refrigerator, a body bag or a container used for the disposal or containment of any contaminated or, preferably, biological waste.

10 When the container is a food refrigerator, the block is preferably placed in a non-airtight container to prevent accidental contact with food contained within the refrigerator.

15 The invention also provides a method of sterilising an airspace comprising the use of a block as described and defined above.

The following examples better serve to illustrate  
20 preferred embodiments of the present invention.

#### Example 1

A tablet of compressed granules was prepared using the  
25 following ingredients in the proportions given:

% wt of total weight of composition	
Citric acid	2.5
Sodium citrate	2.5
Polyethylene glycol (PEG6000)	2.0
30 Talc	1.0
Sodium metabisulphite	73.2
Perfume	0.8
Sodium chloride	18.0

The dry ingredients were mixed together, with the exception of the perfume, which was subsequently sprayed onto the mixed ingredients. The composition was then granulated and fed into a die wherein the granules were  
5 compressed into tablet form by a press having a force of 8 tons.

#### Example 2

10 The method of Example 1 was repeated for the following composition:

	% wt of total weight of composition
Corn starch	1.5
Sodium di-isopropylbenzene sulphonate	1.0
15 Polyethylene glycol (PEG 6000)	2.0
Talc	1.0
Sodium metabisulphite	75.7
Perfume	0.8
Sodium chloride	18.0

20

Both compositions are of utility in effectively sterilising an airspace within a container. The composition of Example 1 is particularly useful for containers in which there is a relatively large amount of  
25 moisture or moist contaminant present, with the buffering action of the organic acid and corresponding salt components moderating the release of sulphur dioxide.

The composition of Example 2 is particularly useful in  
30 sterilising airspaces within containers that contain a relatively low amount of moisture, or contain contaminated materials that are relatively dry.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this  
5 specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and  
10 drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

15 Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise,  
20 each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extend to any novel  
25 one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

30



CLAIMS

1. A sterilising block comprising a sterilising composition for use in an airspace within a container, the  
5 sterilising composition comprising a sulphur dioxide activating compound, wherein moisture absorbed by the block reacts with the sulphur dioxide activating compound to form sulphur dioxide, and wherein the sterilising composition further comprises a water soluble organic acid  
10 and a corresponding water soluble salt of the organic acid.
2. A sterilising block as claimed in claim 1, wherein the water soluble organic acid and the corresponding water  
15 soluble salt of the organic acid each comprise 2-5% wt of the total weight of the sterilising composition.
3. A sterilising block as claimed in claim 1, wherein the water soluble organic acid comprises 1 to 3 carboxylic  
20 acid groups, and the corresponding salt is selected from the group consisting of a magnesium, sodium and potassium salt.
4. A sterilising block comprising a sterilising  
25 composition for use in an airspace within a container, the sterilising composition comprising a sulphur dioxide activating compound, wherein moisture absorbed by the block reacts with the sulphur dioxide activating compound to form sulphur dioxide, and wherein the sterilising  
30 composition further comprises a hygroscopic compound.

5. A sterilising block as claimed in claim 4, wherein the hygroscopic compound is a hygroscopic alkylbenzene-sulphonate.
- 5 6. A sterilising block as claimed in claims 4 or 5, wherein the hygroscopic compound comprises between 1-2.5%wt of the total weight of the sterilising composition.
7. A sterilising block as claimed in any preceding  
10 claims, wherein the block is a solid gel block or is a tablet of consolidated powder or granules.
8. A sterilising block as claimed in any preceding claim, wherein the sulphur dioxide activating compound is a  
15 metabisulphite.
9. A sterilising block as claimed in claim 8, wherein the metabisulphite is sodium metabisulphite or potassium metabisulphite.
- 20 10. A sterilising block as claimed in any preceding claim, wherein the container is a sanitary bin, a medical dressing container, a nappy bin, a used sharps bin, a post box, a refrigerator, a body bag or a container used for  
25 the disposal or containment of any biological waste.
11. A method of sterilising an airspace comprising the use of a block of any of claims 1 to 10.

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 00/03616

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61L2/23 A61L9/012 A61L11/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61L A23B A01N A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, FSTA, INSPEC, COMPENDEX, CHEM ABS Data, EMBASE, MEDLINE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 431 844 A (RENTOKIL LTD) 12 June 1991 (1991-06-12) page 2, line 34 - line 41 page 3, line 26 - line 39 page 3, line 54 -page 4, line 17 examples 2-6	1-11
X	WO 94 10233 A (COMMW SCIENT IND RES ORG ;STEELE ROBERT JOHN (AU); JIANG XIANG ZHO) 11 May 1994 (1994-05-11) page 1, line 5 - line 19 page 2, line 4 - line 13 page 2, line 33 -page 3, line 32 page 4, line 8 - line 15 -/--	1-11



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

### \* Special categories of cited documents:

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- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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